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Some Observations on the Use of the Danish Embryotome.*

By Joseph Birtwistle, M.R.C.V.S., Haslingden.

I am pleased to be present at this meeting this afternoon for two reasons in particular; firstly, because I am afforded an opportunity of bringing to your notice an instrument which I have found to be of such worth that I have reason to expect that others may find it just as useful, or even as indispensable; secondly, because there is no other practitioner, whether in human or veterinary practice, who owes a greater debt of gratitude for the sympathy, encouragement, and practical help of wiser and more experienced members of the same profession. To mention names would be out of place here, but I should make an exception in the case of the one who encouraged me to use this embryotome—I refer to Mr. W. W. Lang, M.R.C.V.S. I have freely received from others, and if the injunction "freely ye have received, freely give" is upon anyone in our profession, it is upon myself.

In so far as describing the instruments is concerned, it is not at all an easy task, and yet the difficulty in this direction consists, not in its complexity, but in its simplicity—it is simplicity itself. The Danish embryotome is so easy to handle and, one might add, so pleasant to handle, that one feels like a child with a new toy; and one is tempted at times to behave like a child inasmuch as one is eager to show and explain it to one's friends who are veterinary surgeons, in order to hear them say what a great thing it is.

Description of the Embryotome.

Here is the Danish embryotome. Its weight is just 3lbs. 2ozs., inclusive of the two thumb screw handles, and special handle attachment; it is therefore much lighter than any other similar embryotome. It is made of pure steel, nickel-plated, and takes the form of two tubes each 2ft. 6ins. long, $\frac{3}{4}$in. in diameter, and $\frac{5}{8}$in. apart. The tubes are held in position and kept rigid by a stay at the distal end, a screw stay in the centre, and also by the double-trumpet-mouthed finish at the proximal end. The diameter of this proximal end is about one inch greater than that of the tubes and allows for the cutting of the wire in any direction; as no matter at what angle the instrument is working, the wire, owing to its flexibility, always threads towards the end of the embryotome. The distal end of the tube is bevelled, this also allows for free play of the wire during the act of sawing, thus preventing undue wear of the wire by friction. You will have noticed already that the function of the tubes is chiefly protective. You have noticed, too, the special handle that screws into the distal end stay; this handle is used for securing the limb—usually by the pastern—to the embryotome during the act of sawing, and is used chiefly in anterior presentations.

Accompanying the embryotome, but separate from it, is a long coil of thin plaited wire. The first wire I used was four stranded, but I have since used the nine-stranded, and in my opinion this latter is stronger and more flexible. The thickness of the wire is not quite $\frac{1}{16}$in. and its weight is roughly 100 grains per 7ft. length. In adjusting the wire into the thumbscrew handles for sawing purposes, the wire is passed through the holes in the centre of the handle and threaded in the groove, and a double loop is passed round here. The thumb screw is then adjusted to prevent slipping and ensure safe gripping.

Use of the Instrument.

Now as to its use. During the last 18 months I have used it on five occasions—on two breech presentations, two lateral deviations of the head with the forelimb presented, and one extreme downward deviation of the head, no limbs presented. Four of these would have been most formidable cases but for the embryotome, and the other would have presented considerable difficulties. May I say here that for some time previous to my possessing this instrument, parturition cases had caused me not a little anxiety. That anxiety is now a thing of the past, for equipped with the Danish embryotome one can confidently go to the most difficult parturition with the conviction that delivery can be effected even in the case of double-headed monsters or six or eight-legged freaks, with very little risk to the mother and much less risk to the professional reputation of the practitioner.

(*a*) Posterior Presentations.

The first time I used the instrument was in a case of breech presentation (thigh and croup). Previously I had dealt with such cases by endeavouring to straighten the limbs, but had invariably failed, and after administering full doses of chloral hydrate (2 to 3 ozs.) had resorted to the forcible extraction of the fœtus by traction. Although this method had been hitherto successful without any bad effects, I was nevertheless convinced that this was the way delivery in these cases should *not* be effected. Therefore, in this case I decided without hesitation to resort to amputation of the hind limbs. After passing the end of the wire through one of the tubes of the embryotome I carried a stout piece of twine into the uterus, and passed it round the limb above the hock. To one end of this I fastened the wire, then pulled the wire round the limb by means of the twine. The next step was to pass the wire through the second or return tube. I had prepared for this difficulty by having a long thin steel rod made, with a hook at one end to which could be attached the wire, and this could then be pulled through. (This rod, which need be only two or three inches longer than the tube, I have found to be a most necessary addition to the embryotome). Having completed the pull-through, I cut the wire at a suitable length, threaded the ends through the thumbscrew handles, and adjusted the thumbscrews

*Presented to the Lancashire Division, N.V.M.A., at Manchester, on 27th June, 1929.

accordingly. Having previously instructed the attendant to hold the instrument securely against the buttocks of the fœtus, I then commenced to sever the limb by sawing backwards and forwards with long, steady strokes. I was surprised, however, to discover that I had sawn through the hock joint, and not the thigh as expected. A similar procedure was carried out in the other limb, and the fœtus was easily extracted with little inconvenience to the mother.

Fortified by this experience, but determined to do even better the next time, I was very anxious to deal with another breech presentation. The opportunity soon came, and this time, after a somewhat similar use of the instrument, I severed both limbs from the trunk right through the heads of the right and left femora. Delivery was afterwards carefully, but easily, effected with the aid of roped hooks.

(*b*) Anterior Presentations.

The method of procedure in anterior presentations is slightly different. Take the case of lateral deviation of the head with both forelimbs presented; here the head was deviated to the left and could not be reached. I decided to remove the right limb, having previously cut a length of wire 7 to 8 feet long. I threaded this through both tubes of the embryotome; the ends were secured to the thumb-screw handles and the special handle was attached to the distal end stay. The right foot of the fœtus was then inserted through the loop of wire—the wire being round the inside of the limb and the embryotome on the outside of the limb. I then placed the proximal end of the instrument into the uterus and as near to the top of the withers of the fœtus as possible—this was to ensure complete amputation of the limb. Previously the limb had been drawn as far as possible outside the passage. The limb was now secured to the handle attachment of the embryotome by means of a thin strong rope tied round the pastern of the fœtus. A few long steady strokes backwards and forwards with the wire, and the limb was severed from the trunk. The other limb had to be removed before delivery could be effected, and a similar technique was adopted, but this time amputation took place by sawing through the head of the humerus. The head of the fœtus was then easily reached and straightened and brought into the passage, delivery taking place without the use of ropes for traction.

In the other case of deviation of the head (both limbs presented) while attempting to sever the limb, the instrument slipped slightly owing to the cord, attaching the limb of the fœtus to the embryotome, giving way, but I completed the sawing process only to find that I had sawn through the scapula. During extraction this became slightly jammed against the walls of the pelvis. I thereupon pushed it back and delivery was again easily accomplished.

One other case in which the instrument proved of inestimable value. In this case parturition had been in progress for six to eight hours. Nothing was presented, the fœtus was practically dry, the uterus was contracted upon the fœtus, and the head was in an extremely downward deviated position with the skull wedged tightly against the pelvic arch. The limbs were brought without much difficulty into the passage and amputation effected. After removal of the first limb, however, there appeared to be less room in the uterus than before, on account of the contraction of its walls upon the fœtus. The other limb was removed similarly, but before complete delivery could be brought about the head had also to be amputated. The trunk was eventually removed with the aid of hooks. The operation from start to finish took only about 30 minutes, and the mother made an excellent recovery.

In conclusion, there are one or two general observations to be made. In the first place, the wire will saw, not only through fœtal bone, but through fully-developed bone; I have tested its power in this respect on a ham bone, which it cut through without any difficulty, making a nice clean cut without any ragged edges. This is important, as the risk of tearing the mucous membrane of the passage from the cut bone is practically negligible.

Then in regard to the length of wire used, I have found it preferable first of all to cut the wire to a suitable length, and 7 to 8 feet is suitable for most purposes. This saves time, patience, and annoyance; for it is surprisingly easy for too much wire of such flexibility to get in the way and become an encumbrance and even dangerous.

In the sawing process the wire must not be allowed to get twisted. Long—*but not too long*—steady strokes backwards and forwards should be used. One length of wire should be used only once; the wire will last much longer than this, of course, but as the strands give way separately, I make a practice of using a length only once, preferring not to take any risk of the wire breaking.

That is all I have to say about this instrument for the time being. I should like to hear now what you think about it; and some of you perhaps wish to ask questions.

Discussion.

Mr. J. Holroyd: I am glad that Mr. Birtwistle has come this afternoon and given this demonstration, the more so because he asked me some time ago for my opinion of the instrument. He showed me his instrument about six months ago and I immediately purchased a similar one. It is a German instrument, which I purchased from a firm in Denmark at a cost of £5 14s. 2d. delivered by post. I also obtained three separate wires which cost 19s. With the instrument I purchased was a long wire rod, with hook attached, for pulling the wire through the tubes; also there was a leaflet printed in the German language which I had translated into English. Probably it would interest the members if I read it:—

"*Embryotome—Method of Use.*

"Consists of two 72 c.m. tubes, fastened together with a rounded steel head, in the shape of a funnel, giving complete protection for the birth passages against the steel wire saw which passes through them.

"In sawing, the part outside the sheath comes right up against the part to be disposed of. Ensures safe quick sawing, sideways as well as backwards and forwards, giving increased adaptability. Three to four yards of saw used—secured by screws in the handles, keep noose round handle to avoid any pulling away. Saw with long firm strokes. Beware of twists in the saw—to avoid this keep it continually taut. Either adjust loop of saw before application or put it round part to be removed and, drawing saw through the instrument, push the instrument forward up against the part required.

"Can also be used for removing parts not directly in the birth passages as in cases of mares (faulty position of head or extremities).

"To saw off normally accessible parts (head, extremities, trunk) push loop of saw over these. Push instrument forward and adjust saw in correct position. This is done

easily if helper keeps saw taut or moves it cautiously to and fro.

"*Cutting Off Head.*

"Instrument in throat and saw over head behind ears; keep instrument firm and saw with long strokes.

"*Cutting Off of Foreleg.*

"Push instrument right up on to the shoulder blade cartilage and fasten metacarpus with strong string; saw loop between shoulder blade and neck, behind elbows. In sawing press head of instrument well against the fœtus. As soon as saw is deep between shoulder blade and ribs, stop sawing in case upper part of shoulder blade is sawn through.

"After cutting through the connecting skin of shoulder blade, the cartilage is removed by twisting and pulling.

"Complete cutting off of forepart can be obtained if the instrument is applied in the same way, but taking the head and neck into the loop of the saw. If application is not possible through the narrowness of the birth passages, the head should be cut off in the way described above. The embryotome is then pushed forward on the outer surface and the metacarpus tied to the instrument.

"*Cutting Off of Hind Leg.*

"Pull hind leg into loop. Push instrument on to outside of leg up into region of loins. Fasten end of instrument to metacarpus with strong string. Push saw in front of knee bone (stifle) and in the joint of the leg.

"The instrument gives good service, not only in cases of faulty position, which in the case of mares is most frequently the cause of requiring the instrument, but also in the case of normal fore or back positions."

I may say here that I had previously used an instrument on the same principle, invented by the late Mr. Fletcher, of Wrexham, but the cutting was done by a linked knife instead of wire.

I have found the instrument exhibited this afternoon very successful in breech presentation cases, especially in heifers. With the linked knife there was the difficulty of sawing at an angle. One could only saw at right angles to the limb or there was danger of breaking the links of the knife, but with wire, owing to it being flexible, one can saw at any angle. One advantage of Fletcher's instrument is that the end of the tube is fixed rigid, and will thus remain firm when in use. I think the loose end of Mr. Birtwistle's instrument may injure the uterine wall. Often there is need to cut off the fore leg of the fœtus and I can see the difficulty, when doing so, of cutting through a shoulder blade, and unless the whole of the scapula is removed there would be no advantage, as the width of the fœtus would not be diminished.

The ordinary chain saw is a distinctly useful appliance, but has the disadvantage that it cannot be used at any angle, whereas an ordinary length of Bowden wire can; but unsheathed Bowden wire can very easily injure the vaginal wall. I think the plaited wire, as supplied with the German instrument, much stronger than the average Bowden wire.

Mr. Holroyd also exhibited the knives that he usually used in embryotomy work.

Mr. E. H. CURBISHLEY thought the instrument was an improvement on a good many of those with which veterinary surgeons had had to content themselves in years past, and that it would go a long way to establishing a veterinary surgeon's position in his district, if used with discretion. Had it not been for the pioneers of the old days, many ideas in force now would never have been brought forward. For instance, when using a chain saw he used to adapt the instrument with a stout iron tube. With regard to not having room—uterine contraction, a condition often met with—he used to give a dose of chloral hydrate to prevent contraction, and as a lubricant he found nothing to equal linseed tea strained through muslin. In dealing with cows, embryotomy was a simple matter compared with the process in a mare. There were several conditions which had not been mentioned which were often met with, such as backward presentation of the head. It was a perfectly simple thing to cut through the neck and it was surprising what a good pair of hands could accomplish. Another condition was bicornual rotatory ventral presentation in a mare, and he wished to know if Mr. Holroyd had dealt with that condition.

Mr. HOLROYD: I have not had a case in a mare, but have had it in a cow.

Mr. CURBISHLEY, continuing, said that in this presentation the fœtus occupied both horns of the uterus, the four feet were presented and the belly was first encountered. It was necessary to remove all four legs (for, if that were not done, one was practically certain to have a rupture) and then proceed as for an ordinary backward presentation. He wondered whether the instrument was long enough in this case, which was always a tedious and troublesome one to deal with. With regard to the instrument, there did not appear to be much in it, except the cover, which he thought was an ingenious idea. He personally preferred to use the knife to the uncovered chain saw. Concerning sterilisation, he would like to know how the wire was sterilised if used for a second time, and how the instrument was sterilised.

Professor G. H. WOOLDRIDGE said that in the first instance he wished to express his pleasure at being present at the meeting and at seeing the instrument introduced by Mr. Birtwistle. He could readily appreciate the advantages it presented compared with the older embryotome. The main advantage, in his opinion, was the one referred to by Mr. Curbishley—the protection of the wire by the tubes. The use of the wire and chain in embryotomy had been in vogue for many years, but the cover was a new and improved idea. There were one or two points which were not altogether in its favour. When he was doing embryotomy he found advantage in being able to retain the skin of the limb by attaching the rope. He appreciated the use of the hook, but thought it might slip and tear through the skin. He had also experienced the difficulty with the knife (referred to by Mr. Holroyd), namely, in cutting away from one or cutting towards one, and the difficulty in gripping the embryotomy knife with the palm of the hand. He preferred the knife which slipped over the finger and was manipulated by the finger, simply exerting pressure and withdrawing. With regard to the instrument exhibited that day, he suggested one modification which might be advantageous, and that was making a slot in the tube about ¼in. to ½in. in depth, to enable the wire to finish flush with the end of the tube. He did not think there was anything in the immobility of the instrument referred to by Mr. Holroyd. He regretted that he had not had a similar instrument when he was dealing with parturition in Cheshire some years ago, as it would have made his work much easier. Referring to sterilisation of the instrument, a point raised by Mr. Curbishley, Prof. Wooldridge did not think that it presented much difficulty, as the wire could be boiled and, so far as the insides of the tubes were concerned, they did not actually come into contact with the animal.

Mr. J. C. NAYLOR said that, as an assistant, he had used the instrument on one occasion and found it very successful. He manipulated the handles to which the wire was attached, and cut through the scapula of a calf in just under a minute.

NUMBERS OF LIVE-STOCK.

The Ministry of Agriculture have issued a return of numbers of live-stock on holdings above one acre in extent in England and Wales as returned by occupiers on June 4th.

The total number of cattle again showed a decrease, the reduction being 70,400, or 1.2 per cent., as compared with a reduction of nearly 4 per cent. decrease recorded last year. The increase, which brought the 1928 number of pigs near to the record number of 1924 was followed this year by the heaviest reduction in any year since 1892. The decrease compared with last year was 606,500, or 20 per cent.

The Physiology of Milk Fever.—III :*†
The Blood Phosphates and Calcium.

By Pierre A. Fish, Cornell University, Ithaca, N.Y.

The work of Little and Wright,[1] confirmed in our laboratory,[2] and the work of Dryerre and Greig,[3] have shown that there is a marked diminution in the amount of blood calcium in cows "down" with milk fever. It occurred to the writer that, since calcium and the phosphates are intimately associated in many of the processes of body metabolism, the phosphates of the blood might also be affected.

Work along this line was begun in September, 1927 and, up to the time of this writing, eighteen cases of milk fever have been examined, and the results have been uniform in showing a subnormal amount of the inorganic phosphates and acid soluble phosphorus, by the Fiske-Subbarow method, prior to the inflation of the udder.

The Amount of Phosphates in the Blood of Dry and Milk Cows.

The amount of phosphates present in the blood of normal cows was determined by examining the pooled blood of a number of dry cows and of cows in milk over a period of nine months (April to December), the blood of each series being pooled separately. The same cows were tested each month and the average number in each group, for the period, was fourteen dry and twenty-three milk cows, representing a total of 124 blood samples from the dry and 210 samples from the milk cows. In all instances the blood was taken from the jugular vein.

In comparing the results, it was found that the phosphate content ran lower in the milk cows than in the dry cows. The average for the milk cows, for the inorganic phosphates, was 4.65 mg per 100 c.c. of serum, and for the dry cows 6.25 mg. per 100 c.c., a difference of 34% in favour of the dry animals. The average of the acid soluble phosphorus for the milk cows was 7.96 mg. per 100 c.c., and for the dry cows 9.32 mg. per 100 c.c., a difference of 17% in favour of the dry cows.

The Effect of Lactation and Milk Fever upon the Blood Phosphates.

The normal process of lactation alone appears to deplete the blood of 25.5% of its inorganic phosphates as compared with the dry cow. There is also a depletion of the acid soluble phosphorus to the extent of 14.5%. The calcium content of the blood is not affected by lactation except temporarily at its onset; the amount was found to be the same in both the milk and dry cows.

With the onset of milk fever there is a radical change in the picture. There is a further depletion of the inorganic phosphates; a reduction of 51% from the normal of the milk cows or of 63.5% if co mpared with that of the dry cows. A similar depletion is observed with the acid soluble phosphorus but less pronounced; there is a depletion of 18.5% as compared with the normal for milk cows, or 30% if compared with that of the dry animals. These pronounced changes are accompanied by a marked depletion of the calcium content to the extent of 66.5%.

In summary, our data appear to show that in normal lactation the amount of inorganic phosphates in the blood is reduced 25.5% from the standard of the dry cow; with the onset of milk fever there is an additional reduction of 38%, which depletes the normal supply to the danger point. In the case of the acid soluble phosphorus there is a reduction of 14.5% with lactation, and a further reduction of 15.5% when milk fever occurs. The calcium content is but slightly and transiently changed when lactation comes on, but with the onset of milk fever its amount is reduced proportionately as much as, or more than, that of the inorganic phosphates. The evidence seems to indicate that the phosphate metabolism of the body is more labile or sensitive to the activity of the mammary gland than is the calcium.

Deficiency of the Phosphates in the Diet. A deficiency of phosphates in the diet is probably quite as important as a deficiency of the calcium. In either case, when a deficiency exists, the necessary supply, in a pregnant animal, is drawn from the tissues of the mother for the proper development of the fœtus. In the Report of the Secretary of Agriculture (*Year Book, U.S. Dept. of Agriculture*, 1925, *p.* 49) it is stated that "the quantity of phosphorus contained in the diet has an important effect on calcium assimilation. If a milking cow received a diet which contains sufficient assimilable calcium, but not enough phosphorus, she will, at first, take phosphorus from her soft tissues to put into the milk; but the phosphorus which can be spared from the soft tissues is small in amount and is soon used up. When this has happened, the cow then begins to take phosphorus from her bones. The chemical composition of the bones is not easily changed; therefore, when phosphorus is taken from them, the calcium comes along with it in the proportion of two parts by weight to one of the phosphorus. Calcium coming from the bones in this way, and not used for milk secretion, is lost in the manure. Thus a cow may lose calcium from her body on account of a shortage of phosphorus in her diet." Under normal conditions in the blood serum, the ratio is approximately two of calcium to one of the inorganic phosphates.

The Effect of Udder Inflation. The accepted remedy for milk fever is inflation of the udder. The effect is relatively rapid, the animal recovering from its collapse or coma, and standing on its feet again, often within a period of six to eight hours. In our tests, the first blood sample was taken just prior to udder inflation, and the second sample, and occasionally a third sample, was taken at various intervals after inflation. In this way it was possible to determine approximately the time required for the phosphates and calcium to get back to their normal standards. The average for the pre-inflation samples for the inorganic phosphates for the milk fever cases was 2.28 mg. per 100 c.c. The average for the pre-inflation samples for the acid soluble phosphorus was 6·49 mg. and for the calcium 3.04 mg. Comparing these averages with the normal for the milk cow, it is found that there is a decrease in the inorganic phosphates of about one-half in the milk fever cases, and but a moderate decrease in the acid soluble phosphorus, while the calcium showed an even greater proportionate

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loss than the inorganic phosphates. The rise of the blood phosphates and calcium following udder inflation is indicated in Table I.

TABLE I.

Date	Case No.	Inorganic Phosphates: Pre-inflation mgs.	Inorganic Phosphates: 10-20 min. after mgs.	Acid Soluble Phosphates: Pre-inflation mgs.	Acid Soluble Phosphates: 10-20 min. after mgs.	Calcium: Pre-inflation mgs.	Calcium: 10-20 min. after mgs.
9/30/28	29	1.05	0.91	2.75	2.71	3.0	3.
10/27/28	32	4.02	3.70	....	....	3.5	2.5
11/10/28	34	1.21	0.97	5.35	5.41	4.5	4.0
	average	2.09	1.86	4.05	4.06	3.66	3.16
		Pre-inflation	6-8 hrs. after	Pre-inflation	6-8 hrs.	Pre-inflation	6-8 hrs.
9/29/27	18	2.6	5.37	....	....	....	....
11/23/27	19	0.31	2.29	4.71	8.05	1.75	7.75
3/ 7/28	21	2.25	6.46	9.85	10.71	5.5	0.75
10/11/28	31	1.91	6.66	7.25	10.04	2.	5.
11/23/28	35	1.93	6.22	7.18	9.91	3.5	8.
	average	1.80	5.40	7.25	9.67	3.18	5.4
		Pre-inflation	10-18 hrs. after	Pre-inflation	10-18 hrs.	Pre-inflation	10-18 hrs.
2/29/28	20	2.29	3.17	6.71	7.88	5.0	7.5
3/31/28	22	4.18	6.38	6.34	10.08	2.0	7.
6/ 2/28	25	2.05	3.91	7.78	9.31	3.5	4.5
9/10/28	28	1.47	4.27	6.05	7.95	3.0	7.5
10/ 3/28	30	2.04	3.95	5.10	6.11	3.0	8.0
	average	2.40	4.33	6.39	8.26	3.3	6.9
		Pre-inflation	24-36 hrs.	Pre-inflation	24-36 hrs.	Pre-inflation	24-36 hrs.
3/ 7/28	21	2.25	3.30	9.85	11.95	5.5	9.5
5/ 2/28	24	3.91	6.94	8.28	12.35	4.5	7.0
7/ 2/28	27	2.31	6.87	8.41	12.95	3.5	5.5
9/30/28	29	1.05	1.31	2.75	3.81	3.0	4.5
10/27/28	32	4.02	3.17	....	....	3.5	10.0
11/ 4/28	33	3.00	4.27	3.05	11.71	4.5	10.5
11/10/28	34	1.21	1.67	5.35	3.08	4.0	5.0
	average	2.53	3.93	6.28	9.31	4.07	7.43

Some discrepancy may seem to exist in the number of cases referred to in the text and those appearing in the tables. Certain cases not falling in the proper time intervals or in which only single pre- or post-inflation samples were taken are not included, and occasionally a test was omitted for lack of a sufficient supply of material. A few samples were also tested for the calcium but not for the phosphates. Tests were made on twenty-two individual cases for calcium, either pre-inflation or post-inflation samples or both, and similar conditions applied to the phosphates for eighteen individual cases. Where more than two samples were taken from the same animal a duplication of the pre-inflation sample exists. From the data given in the tables the following graph has been constructed. (See Fig. 1.)

The curves indicate that the phosphates and calcium remain at a low point or diminish for twenty minutes or more after inflation and that the most rapid rate of return toward normal has occurred before, or by, the six to eight hour period. The most striking gain is shown by the inorganic phosphates which have more than doubled in quantity, and even exceeded the normal average, although they decline gradually in the later periods. The acid soluble phosphorus fluctuates in the later periods but remains above normal. The calcium gains considerably, but at the six to eight hour period is still far from the normal. Some individual cases have shown the presence of as much calcium in their pre-inflation samples as is represented in our average for the six to eight hour period. This evidence indicates that the phosphates respond more promptly and reach their normal standard much more rapidly than does the calcium as a result of udder inflation.

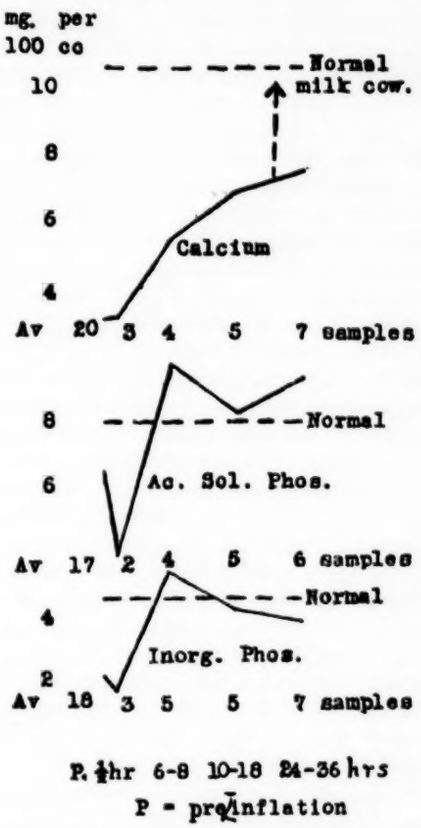

Fig. 1. Curves of calcium and phosphorus from milk fever cases.

Our work on the blood calcium supplements that of Little and Wright and that of Dryerre and Greig. Some of their "later" samples were taken from one to three weeks after recovery. The majority of our samples were taken nearer to the time of the onset of the disease.

Dryerre and Greig cite three cases in which post-inflation samples were taken five, nine-and-a-half, and ten hours after the cow was "down." Their results agree very closely with our own for the six to eight hour period. Subsequent samples three days, three-and-a-half days and seven days later showed a return of the calcium to the normal range (9-11 mg.). They also note a rapid rise in the five to ten hour period with a more gradual rise later, and that after the maximum is reached there is a slight decrease. They also cite two cases in which the calcium had returned to normal in twenty-four hours. In the seven cases tested by us for the twenty-four to thirty-six hour period, three had reached normal, but four were still subnormal. In testing the effect of udder inflation on normal lactating ewes Dryerre and Greig found there was an increase of about 10% in the calcium content of the blood.

Our cases No. 19 and No. 21 present some unusual features and deserve some special consideration. Case 19 showed the lowest amount of calcium and inorganic phosphates in the pre-inflation samples of any in our series; both were at the lowest ebb, the calcium being only 1.75 mg., and inorganic phospates 0.31 mg. in amount. After udder inflation the calcium had increased five fold and the phosphates seven fold up to the six to eight hour

period. On the third and fourth days the blood was taken from the mammary instead of the jugular vein ; the calcium had returned to its maximum normal, and the phosphates were extraordinarily high. The cow made an uneventful recovery. Case No. 21 showed nothing unusual as compared with other pre-inflation samples, but in the six to eight hour period there was a remarkable drop in the calcium to 0.75 mg., the lowest determination we have made in the series, and the only instance in our experience in which the calcium continued to decrease over an extended period after the udder had been inflated. In the twenty-four to thirty-six hour period the calcium had returned to normal. In the six to eight hour period the phosphates had promptly risen to above normal, but in the twenty-four to thirty-six hour period, had fallen to only one-half the amount found in the previous period. This case developed metritis later, and the unusual features may have had some relation to that disorder. The cow was on her feet within a reasonable time after udder inflation, but was down again at the six to eight hour period. When first seen, her pulse was 82, temperature 101.5° F., and respirations 20. At the six to eight hour period the pulse was 88, temperature 103.2° and respirations 22. The udder was not reinflated.

Aside from its effect on the phosphates and calcium of the blood, the inflation of the udder undoubtedly contributes other factors which assist materially in the recovery of the patient.

The Blood Calcium and the Parathyroid Glands. The removal, or a diseased condition, of the parathyroid glands is followed by a reduction in the amount of the calcium in the blood. Experiments with parathyroidectomised dogs have shown that although a hypocalcæmia is produced there is not a corresponding effect upon the blood phosphates. Instead of a decrease there is a considerable augmentation of the phosphates in the blood. The effect of the operation is to cause an increased elimination of calcium and a decreased elimination of phosphates, so that a phosphate retention occurs.

The existence of a hypocalcæmia having been demonstrated in the blood of milk fever patients ; it might, as a matter of course, seem natural to correlate the condition with some disturbance of the parathyroid function. Up to the time of our experiments we have been unable to find any record of research on the blood phosphates in cows suffering from milk fever. Each of these eighteen cases examined in our laboratory showed a considerable and consistent reduction of the phosphates as well as calcium prior to the inflation of the udder ; the average reduction being about 50% as compared with the normal for the cow in milk. These results do not therefore harmonise with those obtained in parathyroidectomy so far as the phosphate factor is concerned, and introduce a difficulty in correlating the phenomena associated with milk fever with a disturbed parathyroid function. In milk fever there is increased elimination of both phosphates and calcium. The sudden onset of the disease and the dramatic recovery, all within a few hours, cause doubt as to the existence of any extensive pathological change in the parathyroid glands. Pathological changes, as a rule, require more time for their production and return to normal.

The work of Reed, Lackey and Payte[4] on the "Relation of Calcium and Phosphorus in the Blood of Parathyroidectomised Dogs" and the earlier work of Greenwald[5,6], show clearly that although there is a diminution of the blood calcium there is an increase in the amount of the phosphates following parathyroidectomy. Reed, Lackey and Payte find that the calcium-phosphate ratio is higher in normal than in operated dogs. In the normal, the ratio is 2 or a little over, and in the operated animals 1 or under.

In milk fever the calcium-phosphate ratio is not a true index of the actual conditions, because there may be a proportionate decrease of both constituents, and the ratio not affected, although the amount of each is far from normal. We believe a more reliable index is the calcium-phosphate product (area). In normal milk cows we found the Ca : P ratio to be 2.3 and in dry cows 1.7 and the Ca x P, product (area) to be 50.08 in milk cows and 67.00 in dry cows. In the milk fever cases the ratio was irregular; sometimes normal and sometimes either too high or too low ; the Ca x P, product (area) was uniformly too low. Our results are shown in Table II.

TABLE II.

MILK FEVER CASES.

Date	No.	Calcium	Inorganic Phos	Ca : Phos	Ca x Phos.
	Milk Cows Normal	10.77	4.65	2.31	50.08
9/29/27	18	....	2.63	....	....
11/23/27	19	1.75	0.31	5.7	0.54
2/29/28	20	5.	2.29	2.3	11.45
3/ 7/28	21	5.5	2.25	2.4	12.37
3/31/28	22	2	4.18	0.47	8.36
4/21/28	23	6	1.75	3.4	10.50
5/ 2/28	24	4.5	3.91	1.1	17.59
6/ 2/28	25	3.5	2.05	1.7	7.17
6/21/28	26	2	2.87	0.69	5.74
7/ 2/28	27	3.5	2.31	1.5	8.08
9/10/28	28	3	1.47	1.	4.41
9/30/28	29	3	1.05	2.8	3.15
10/ 3/28	30	3	2.04	1.4	6.12
10/11/28	31	2	1.91	1.05	3.82
10/27/28	32	3.5	4.02	0.87	14.07
11/ 4/28	33	4.5	3.00	1.5	13.5
11/10/28	34	4.5	1.21	3.7	5.44
11/23/28	35	3.5	1.93	1.8	6.75
	Average	3.57	2.28	1.9	8.18

The average for the calcium-phosphate ratio is but little below normal, but marked variations exist in individual cases. The calcium-phosphate product (area) is considerably and consistently lower than the normal ; the normal being about six times greater than the average for the milk fever cases.

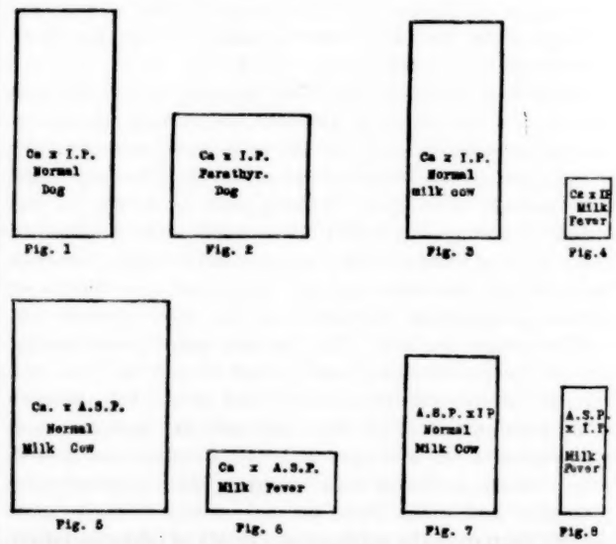
Ca x I.P. Normal Dog
Ca x I.P. Parathyr. Dog
Ca x I.P. Normal milk cow
Ca x I.P. Milk Fever
Ca. x A.S.P. Normal Milk Cow
Ca x A.S.P. Milk Fever
A.S.P. x I.P. Normal Milk Cow
A.S.P. x I.P. Milk Fever

Fig. 1 Fig. 2 Fig. 3 Fig. 4

Fig. 5 Fig. 6 Fig. 7 Fig. 8

Figures of the calcium phosphate product (area) in normal and affected animals.

Fig. 1. Shows the normal Ca x I P Area in the blood of the dog.

Fig. 2. After parathyroidectomy. Note the shrinkage of calcium and increase of inorganic phosphates.

Fig. 3. The normal Ca x I P Area in the blood of milk cow.

Fig. 4. The Ca x I P area as found in the pre-inflation tests of milk fever cases. Note the marked shrinkage of both calcium and inorganic phosphates as compared with Figs. 2 and 3.

Fig. 5. The Ca x A. S. P. area in the blood of the normal milk cow.

Fig. 6. The corresponding area as found in milk fever. Note that the acid soluble phosphorus has shrunk as well as the calcium.

Fig. 7. The normal A.S.P. x I P area for the blood of the milk cow.

Fig. 8. The corresponding area in milk fever cases The shrinkage has not been so great as in the other milk fever diagrams, but it is nevertheless quite evident.

The differences in Ca x P areas in the normal and parathyroidectomised dogs, and in the normal milk cows and in the pre-inflation samples from milk fever cases are shown in the previous diagrams. The diagrams for the normal and parathyroidectomised dogs are constructed from the data given in the article of Reed, Lackey and Payte.

In comparing the calcium-phosphate areas and the acid soluble phosphorus—inorganic phosphate areas of the normal with the pathological conditions, the differences are at once evident. In the case of the dogs, the normal area is 1.3 times greater than after the removal of the parathyroids. The decreased calcium is to some extent compensated for by an increased amount of the phosphates. In the normal milk cow the calcium-inorganic phosphate area is 6.1 times greater than in the milk fever cases ; in the case of the calcium-acid soluble phosphorus area, the normal is 4.3 times greater than in milk fever, and the acid soluble phosphorus-inorganic phosphate area is 2.5 times greater than milk fever.

The following is a summary obtained from the three groups investigated :—

	Calcium	Inorg. P.	A.S.P.	Ca : P	Ca x P
Normal, Dry Cows	10.72	6.25	9.32	1.7	67.00
Normal, Milk Cows	10.77	4.65	7.96	2.3	50.08
Av. Milk Fever	3.04	2.28	6.49	1.9	8.18

Hexose Phosphate-Lactacidogen. It is not impossible that the physiological catastrophe occurring in milk fever is more complicated than can be accounted for by the simple explanation that it may be due to an excessive drainage of the phosphates and calcium from the body. Such an excessive drainage may profoundly affect the functional activity of the soft tissues. There is a hyperglycæmia to be accounted for. This may be due to an increased conversion of the liver glycogen into sugar, or it may be due to a condition in the tissues, especially the muscles, whereby they are unable to utilise the sugar brought to them by the blood. Muscular tetany, evidenced in many of the patients, indicates that the muscles are very much involved.

The investigation of Embden, Meyerhof and others[7] give evidence of the presence of a substance in muscle through which the muscle glycogen passes in the production of glucose and lactic acid. This substance is called hexose phosphate or lactacidogen. In the contractile phase of the muscle one-fifth of the substance is converted into glucose, which is further converted into CO_2 and H_2O, and the remaining four-fifths is converted into lactic acid and phosphate.

In the recovery phase of the muscle the lactic acid and phosphate, through a reversible process, are converted again into hexose phosphate and glycogen, and the cycle can again be repeated. Enough confirmatory work has been done to indicate that hexose phosphate is somehow intimately concerned with muscular activity ; but it must be admitted that certain details are not yet entirely clear.

On this basis, the metabolism of muscle possibly indicates a greater use for phosphates than for calcium. The low phosphate content and the high sugar content of the milk fever blood is possibly suggestive of some disturbance of the hexose phosphate relationship and offers a possible explanation as to why the muscle is unable to use the blood sugar and thereby cause a resultant hyperglycæmia.

Relative Importance of the Phosphates and Calcium as the Causative Factor. At this stage of the investigation only theoretical observations can be offered. In the normal process of lactation the blood calcium suffers only a temporary diminution and soon returns to normal ; the phosphates suffer a greater diminution, and apparently remain diminished while milk production goes on. Both substances are important constituents of milk, and are represented there in much greater amount than in the blood, and both are intimately associated with casein. With the onset of lactation in milk fever in heavy milkers, the drainage from the blood and body tissues may be so great as to disorganise metabolism. It is probable that too great a depletion of the phosphates alone or calcium alone would produce serious consequences. With a simultaneous depletion of both of these important constituents the result is still more serious.

The beneficial effect of udder inflation is evidenced from data already given showing that the depleting process is checked and, with a return of the phosphates and calcium towards normal, improvement results. Our data indicate that the phosphates reach normal first, within a period of six to eight hours, and that the calcium, at this time, is still too far from normal to account for the apparent recovery of many of the patients within this time limit. The data also show that the phosphates decline again to some extent, but not far below the normal for the milk cow, and that during this period the calcium is still increasing. This secondary decline of the phosphates may possibly be associated with the hexose phosphate metabolism of the muscles and assist in reducing the hyperglycæmia to the normal sugar content.

The evidence seems to indicate that the phosphates are more sensitive or responsive than the calcium to the activity of the mammary gland. The lower percentage of phosphates in the blood of the milk cow, as compared with the dry cow, while the calcium remains unchanged, seems to confirm this view. The more rapid return of the phosphates to normal after udder inflation, and the coincident recovery of many of the patients at this time may have special significance, and the more gradual yet steady increase of the calcium may have a reinforcing effect.

Another consideration which may be of importance is the rôle that the phosphates may play as a buffer in

maintaining the proper degree of alkalinity in the blood stream. Regarding a buffer as a substance which eases the shock of contact with acid or alkaline material, a reduced amount of the phosphates may predispose toward an alkalosis or acidosis according to the conditions present.

An automobile will run smoothly even when the oil in its transmission is less than it should be. There is no evidence of impending disaster until the amount of oil has passed the minimum limit, and then things happen quickly. Milk fever seems to present a similar analogy. There are no premonitory symptoms ; the general metabolism seems to be running smoothly, until the amount of the phosphates and calcium in the blood transmission has fallen below the minimum limit, and then again, things happen quickly and the cow collapses. It would appear to be logical and just as necessary to keep the phosphate-calcium supply at its proper level in the blood transmission of the animal as it is to maintain the oil at its proper level in the transmission of the automobile.

Summary.

In eighteen cases of milk fever the blood phosphates were found to be uniformly and consistently lower than normal.

The calcium was likewise found to be subnormal, confirming the earlier work of Little and Wright, and agreeing with the observations of Dryerre and Greig.

Both phosphates and calcium were reduced 50% or more in amount in the pre-inflation samples.

The average content of the blood phosphates is lower in milk cows than in dry cows. The calcium content remains constant in both groups except for a short time at the onset of lactation.

A deficiency of the phosphates in the diet may be of as great importance as a deficiency of calcium as a predisposing factor.

The coincidence of recovery with the return of the phosphates to normal after udder inflation, while the calcium is still subnormal in amount, suggests a greater relative importance in getting the phosphate metabolism re-established first possibly in connection with its buffer influence in the blood. Although the calcium lags behind, its gradually increasing amount probably exerts a reinforcing effect and maintains the gains that have been made. It is difficult to explain the early recoveries on the basis of a supply of blood calcium that is still abnormally deficient.

The existence of a disturbance of the function of the parathyroid glands in milk fever may be questioned on the ground that parathyroidectomy, while decreasing the amount of calcium, causes an increase in the amount of the phosphates, whereas in milk fever the phosphates, proportionately, are decreased quite as much as the calcium.

A possible function of the phosphates, relatively more important than that of the calcium, may occur in connection with the metabolism of the muscle and its hexose phosphate constituent. A disorganisation of this compound because of lack of phosphates may assist in explaining the hyperglycæmia characteristic of milk fever. The secondary drop in the amount of the phosphates later may be due to the renewed use of the phosphates by the muscle and the subsequent return of the blood sugar to its normal amount.

A discrimination as to the relative importance of the phosphates and calcium is difficult. They are intimately asssociated with each other in the various bodily functions ; both are important constituents of milk ; but the investigations of Embden and Meyerhof and their school of workers open up a new vista for our consideration in which the phosphates may be concerned in the carbohydrate metabolism of muscles—and the muscles form the chief bulk of the body.

Acknowledgements. We are especially indebted to the Department of Ambulatory Clinics for the interest manifested and to Drs. M. G. Fincher and W. J. Gibbons for their hearty co-operation and the trouble they have taken to procure the blood samples. Also to Dr. C. E. Hayden and J. Sampson for laboratory assistance.

References.

1. Little, W. L. and Wright, N. C., "The Ætiology of Milk Fever in Cattle," *British Jour. Exper. Path.*, 129, vi, 1925.
2. Fish, P. A., "The Physiology of Milk Fever II," *Jour. Amer. Vet. Med. Assn.*, 1928, lxxiii, 10.
3. Dryerre, H. and Greig, R., "Further Studies in the Etiology of Milk Fever," Dumfries and Galloway Vet. Med. Assn., July 7th, 1928. Oliver & Boyd, Tweedsdale Court, Edinburgh.
4. Reed, C. I., Lackey, R. W., and Payte, J. I., "The Relation of Calcium and Phosphorus in the Blood of Parathyroidectomized Dogs," *Proceed. Soc. Expt. Biol. and Med.*, Nov., 1927, xxv, 136.
5. Greenwald, I., *Amer. Jour. Physiol.*, 1911, xxviii.
6. Ibid., *Jour. Biol. Chem.*, xiv, 1913, also xv, 1916.
7. References in "Recent Advances in Biochemistry," by John Pryde. 2nd Edition, 1928, 210.

Just as this paper was coming from the press, my attention was called to an article by B. Sjollema, on "The Nature and Therapy of Milk Fever and of Symptom Groups Associated Therewith," *Deutsch. Tierärzt. Wochnschr.*, Vol. 37, 1929. The article deals chiefly with the calcium deficiency in the blood and the use of calcium chloride for the cure of milk fever. A reduced content of the blood phosphates is also mentioned.

Shropshire's Concern at the Sheep Scab Position.

The Shropshire County Council, at a recent meeting, resolved, on the recommendation of the Diseases of Animals Committee, (1) That, having regard to the continued increased number of cases of sheep scab in the country, the County Councils' Association be urged to press upon the Government the necessity of introducing legislation placing the onus of the eradication of the disease upon the owner, with consequent penalties. (2) That a copy of the foregoing resolution be sent to the Ministry of Agriculture, the County Councils in England. Wales and Scotland, and to each local Member of Parliament.

The Tail-Waggers' Club.

The Tail-Waggers' Club, on August 14th, reached a total membership of over 100,000. Already from the proceeds of the club and other activities of the National Dog Week Council nearly £12,000 has been passed to the Royal Veterinary College Fund for the continuation of the Poor People's Out-Patients Department (handling over 10,000 cases a year), the rebuilding of the canine departments of the college, and the establishment and endowment in perpetuity of a Professorship of Canine Medicine and Surgery, for which purposes a sum of £20,000 is required.

The Veterinary Record.

7th September, 1929.

AT AYR.

Burns' land gave a warm, if wet and boisterous, welcome to the highly satisfactory number of veterinarians and their ladies from all parts of the British Isles who arrived in time to participate in last Saturday's Annual General Meeting. At the time of writing—with more than half the Congress yet to run—the elements have relented somewhat, and there is thus every prospect that in our summing-up of the outstanding event of the Association's year the social side of affairs, to which the sun is such an asset, will be found to have played to the full its part as an essential factor in the achievement of a complete Congress triumph such as was demanded if the West of Scotland meeting was to bear comparison with the then "record" gathering held at Aberdeen in 1924.

Ayr is making a bold bid for honours. The retiring President, as was universally accepted in anticipation, gave the Congress a magnificent send-off with a wholly-inspiring Presidential Address, delivered to an enthusiastic assembly in the Great Hall of the County Buildings. Dr. Bradley's masterly review of the work and progress both of the Association and of the profession during the seven-year period which has elapsed since he last adorned the Chair will give to the Special Congress Number which contains it (to be published as the last issue of the month) a special measure of historic value.

The election of Mr. G. P. Male, of Reading, as Dr. Bradley's successor, taking place, as it did, in such a centre of clinical activity as Ayrshire, was a singularly appropriate event, and one emphasising, both in its individual and general application, the desire of the Association to render honour to whom honour is due.

This is indeed an election upon which both Mr. Male and the Association are to be heartily congratulated in relation to a period of presidency which will terminate with the holding of the Eleventh International Veterinary Congress in London. In the light of the latter event it was naturally decided that, for next year, the Association should condense its proceedings to the minimum required by its constitution, meeting in London on a day prior to the opening of the International, which takes place on August 4th—9th, 1930.

CLINICAL AND CASE REPORTS.

A Puzzling Case of Rupture of the Stomach in a Mare.

By O. V. Gunning, M.R.C.V.S., D.V.M. (Ohio), Tutbury.

The subject was an in-foal, bay Shire mare, eight years old, which was found about 7 o'clock in the morning to be suffering from abdominal pain. As the mare was lying out it was not known at what time the condition actually started. The owner did not summon professional aid immediately, but as the mare appeared to be getting worse I was requested to attend. On my arrival (about 11 a.m.) I was told that the mare had been in great pain and on several occasions had violently thrown herself to the ground; indeed, the pain was such that the owner thought she would die before my arrival, but since vomiting she was a little easier.

I found the mare walking aimlessly round. Ingesta was dripping from both nostrils. Every now and then she would attempt to vomit and at such times a small quantity would come away, and close by there was a patch on the grass where several quarts of liquid stomach contents had been vomited. The breathing was painfully laboured; the temperature below 100. The upper eyelid had a puckered appearance. Both flanks were tense and tympanitic and peristalsis seemed quite absent.

My first impression was that a rupture of the stomach had taken place, but on feeling the pulse, to my surprise, it was quite strong and easily counted. The stomach tube was quickly inserted and between three and four quarts of liquid green ingesta flowed out. The stomach was then repeatedly washed out with half-gallon quantities of saline formalin solution and in this way another two quarts more material were drawn off than were put in. After a time a quantity of gas was liberated, which lowered the tympany at the flanks. During this washing process the mare became easier, breathing improved, the eye became more tranquil and noisy rumblings could be heard throughout the previously dead intestinal tract. About 1 o'clock ol. tereb. ℥iii; æth. nit. ℥ii were given in a pint of linseed oil and half a pint of water. The mare was removed to a loose box and from her appearance I felt certain that she from now on would make an uninterrupted recovery.

On visiting the case again at 5 p.m. I was surprised to find the mare again breathing badly. The owner told me she had been quiet from one until three o'clock, when she again tried to vomit a little and had since been uneasy. She had evidently been down and was anxious to go down again. The pulse was the one good sign; it was stronger and steadier (54) than at my first visit. The syphoning of the stomach was repeated with the half-gallon quantities of the saline intake and out-take, carefully measured, and about three quarts more removed than inserted. The oil was recognised to return in the syphonage as very minute globules. Ol. tereb. and æther, *aa* ℥ii, were left in the stomach, but no oil. The mare again became easy.

She was seen again at 10 p.m. by my assistant when she was again uneasy. Four quarts of liquid stomach contents were drawn off before irrigation was commenced, and irrigation brought away another two quarts. Ol. tereb. and æther meth. were left in the stomach. The owner

reported the mare to be very much easier during the night; so much so, that at 3 o'clock he returned to rest, but when we saw the mare on our arrival at 8 a.m. she was dead.

Post-mortem revealed a rupture of the stomach, at its greater curvature, 17 or 18 inches in length. In the stomach there was approximately three pints of soft, green ingesta and, mixed up with the mesentery, a similar quantity. The mucous membrane of the stomach (both cardia and pylorus) showed a thickened appearance—almost gritty when scraped with a knife; there was a considerable number of bots, but no sign of ulceration. The stomach wall all round the the pyloric opening was dark coloured. This discoloration (only more intense) was continued for about two and a half feet along the course of the duodenum, when it abruptly altered to a normal colour. The small intestine anteriorly for several yards was completely empty of ingesta, and the posterior portion only contained a very small quantity which, in colour, was more creamy than green. Instead, the small intestine contained an exudate resembling custard; at least two pints were squeezed out. The mucous membrane was of a livid yellow hue and catarrhal in appearance. On entering the large bowel at the ileo-cæcal valve, green ingesta again appeared, but the large bowel was unusually empty and showed little inflammation. The floating colon in parts contained a few pus-like coated fæces and even pus-like material in the interior of the pellets; however, the floating colon was practically empty, as was the rectum, the walls of which seemed literally adherent in parts by a false membrane, which left threads when torn away. There were strongyle-like lesions in the cæcum.

From the inflammatory condition of the pylorus and adjacent duodenum found on *post-mortem*, it would seem that the trouble was caused through a locking of the duodenal trap. It is not easy to understand why this was not relieved after the mechanical removal of the stomach contents, unless the acute inflammation had paralysed peristalsis. Nor is it easy to understand why rupture was so long delayed. Had the rupture taken place during the violent struggles of the animal at the outset of the attack, the explanation would have been simple, but it would appear that rupture did not actually take place until at least 15 or 16 hours after that time and then after the stomach had been mechanically relieved of at least 15 quarts of stomach contents, in addition to the amount vomited by the animal.

With regard to the actual cause of the condition, there was a history that the mare had had free access, the day previously, to a quantity of freshly-cut willow. The symptoms in this case in many ways correspond to those shown by a four-year-old Shire filly which was treated by myself in November, 1927, and which also was suspected of having eaten willow. This animal did not actually vomit, but showed symptoms of choke with a bulging of the œsophagus in the lower third of the neck. A tube was passed. As soon as this reached the swollen part of the neck a quantity of dark green ingesta gushed out. Several hours were spent in syphoning the stomach and this animal made an uneventful recovery.

I find no mention of willow poisoning by Lander, Long or Craig, but the question arises in my mind, if the fresh green shoots of willow, when eaten in excess, may secrete a toxin, or whether it is only a case of rapid fermentation similar to that caused by an excess of green clover.

Endocarditis, Intermittent Hydronephrosis, with Duodenal and Rectal Stenosis.

By Joseph Birtwistle, M.R.C.V.S.,
Haslingden.

The following case illustrates difficulty and uncertainty in diagnosis, complications which may mask primary disease, and wrongly-supposed successful treatment, and suggests scope for the application in canine practice of such diagnostic methods as radiography, pyelography and cystoscopy.

The subject was a Fox Terrier dog, aged nine years, which had been unsuccessfully trying to pass fæces for the last two days, and seemed in considerable distress. Fourteen days ago it refused food, but continued to drink large quantities of water; it was, however, in apparently good general condition. Eighteen months before this it had been run over by a farmer's milk float, the wheel passing over its abdomen, but, apart from a little shock, which passed away in a few days, this accident had caused it no apparent inconvenience.

Digital examination revealed complete stenosis of the rectum one and a half inches from the anus. External palpation revealed tenseness of the abdomen, but nothing conclusively indicative of intestinal impaction, although the owner was impressive in his insistence that his dog was "a little beggar for eating wood." This tenseness, especially after so long a period of fasting, was, however, very confusing, and there was not sufficient evidence to justify a positive diagnisis of abdominal tumour. Rectal examination was again resorted to with a view to ascertaining the condition of the prostate, and although this was enlarged I was unconvinced that it was the cause of the stenosis. Diagnosis was thereupon suspended, and the dog left for further observation.

Medicinal treatment consisted of liquid paraffin and phenophthalein in emulsion form, but, as there was no change in the condition of the rectum, operative interference was decided upon. The prostate was not sufficiently enlarged, nor the condition of the patient such as to justify castration. The cause of the stenosis being unknown, I decided upon a minor operation, somewhat similar to that for the removal of ectropium, which, although entirely empirical, I have judged to be successful in a few obscure diseases of the rectal and anal regions. Under local anæsthesia a longitudinal incision about one inch long was made first under, but slightly to the left of, the anal aperture and an elliptical piece of skin and underlying muscular tissue were removed. A similar incision and operative procedure was carried out on the right side parallel to the first incision.

Slight general improvement was noticed for the next two days, but there was still no attempt to pass fæces or urine, and the condition of the stenosis remained unchanged. Full doses of liquor strychnini hydrochloride and sodium salicylate were given every four hours, with the result that during the night a very large quantity of urine had been passed, as ascertained by the very wet bedding. Digital examination of the rectum was again carried out, and this time the index finger could easily be passed, no obstruction of any kind being evident. Abdominal tension, too, was relieved, and during the day defæcation was normal.

It was now anticipated that recovery might follow, and for the next three days improvement was maintained, although the appetite did not return, and as it was thought the patient might do better in this respect if at home with its owner I advised its return, giving, however, a very guarded prognosis. There was, however, no improvement, and the patient finally refused both food and water. Death took place on the fourth day.

Post-mortem. On opening the abdomen on *post-mortem* a large cyst, the size of a cricket ball, was encountered. This was carefully dissected from its attachments, and was found to be the remains of the left kidney. It was attached to the substance of the liver and the diaphragm by bands of dense fibrous tissue. Sterile fluid of the appearance of normal urine filled the cyst, but no quantitative analysis was made. A careful macroscopical examination of the accompanying ureter was made, and this was found to be apparently normal, with no kink, no cicatrical tissue, no calculus; its muscular and mucous coats were normal, but at its terminal part it pierced the muscular coat of the bladder a quarter of an inch posterior to the right ureteral orifice but on the left lateral aspect. The pelvis and calyces of the kidney were dilated, and the organ presented a "series of irregularly-rounded bosses corresponding to the various dilated calyces."

The bladder was normal in appearance, with no trace of sabulous deposits or injury to its mucous membrane. The prostate was twice the normal size, soft in structure, and very congested. The right kidney and ureter were normal. On examination of the intestines these were found to be of normal appearance with the exception of the stomach, the muscular and mucous coats of which were extremely thin, and the duodenum, the muscular coat of which was enormously thickened to the extent of a quarter of an inch —almost incredible—the result being chronic partial duodenal stenosis. The heart was a perfect pathological specimen of endocarditis, with irregular papilliform vegetations on all the valves, with short, thick, adhesive chordæ tendinæ, stenosis of the orifices, and with consequent hypertrophy of the musculature.

Frog-shoeing Dangers.

Arising out of a letter to the daily press from Captain Fairholme, chief secretary of the R.S.P.C.A., advocating frog-shoeing as the "most practical and cheapest way" to give horses a good grip on the roads, Mr. J. W. McIntosh, M.R.C.V.S., F.R.S.E., has written that this method is "neither practical nor economic under present road conditions. Direct frog pressure," he writes, "can only be obtained by lowering (by the thickness of the shoe) the heels, and this is a procedure which should not be practised, as it exposes the foot to serious and permanent dangers. . . . The flexible steel bridge pad as recommended by General Sangster and the Institute of the Horse is undoubtedly the most reliable non-slip device we have. When properly adjusted it affords that security of foothold which is so much needed to-day, permitting the frog to function naturally by indirect pressure, whilst it has the advantage of being clean, and does not allow that accumulation of filth which is liable to occur underneath absorbent leather and canvas."

Gift for Veterinary Research.—The Government of New South Wales has accepted a gift of £20,000 from Mr. F. D. McMaster for the erection of an animal health laboratory by the Scientific and Industrial Research Department.

From The Veterinarian, March, 1829.

On the Practice of Uncertificated Veterinary Surgeons.

By Mr. Brown, of Melton Mowbray.

Sir,—I had much pleasure in reading the letter of Mr. Langworthy, on "The Grievances of the Veterinary Profession" in your last number. The plan which he proposed has long been in contemplation with me as the only way we have of seeking redress. I have thought much upon the subject, and have conversed with many upon the propriety of such a mode of proceeding; not merely with veterinary surgeons, but with medical men, and the public in general, and they are unanimous in their opinion that some enactment is necessary, not only for the protection of the veterinary profession, but for the interest of the community at large. It is well known that many valuable horses have been destroyed by the ignorance of men who have been pupils at the Royal Veterinary College for a short period, and who, probably on their entering that institution, did not know the off leg from the near. These persons, after hearing a few of the Professor's lectures, and going round the stable with Mr. Sewell, without taking the trouble of dissection, or thinking for themselves, have left the College, and assumed the appellation of veterinary surgeons, not having passed the ordeal of the medical committee as it now stands: and it is universally admitted that the present veterinary examining committee would be much improved by adding some veterinary surgeons to their number. Where, however, would be the utility of such an arrangement, unless the certificated veterinarian and the public are protected against empiricism by the government of their country? There are seven individuals of this class practising the veterinary art within the small circuit of twenty-five miles in the neighbourhood of Melton Mowbray; and a surgeon also, who has abandoned the medical for the more humble veterinary profession, without having had any previous veterinary education, at least at the Royal Veterinary College, and whose profound skill in our art is only equal to that of the most ignorant practitioner who has offered himself to public notice in the same capacity. Innumerable are the instances of mismanagement and failure which the employers of these gentlemen have to regret; and who loudly exclaim against the fraternity of veterinarians, and give a decided preference to the groom or village blacksmith.

"If we suffer this contagious sickness, farewell all physic."

These are some of the grievances of which the members of the veterinary profession, and the public, have to complain; the former in consequence of the degraded state of that most useful art which they profess, and the latter, on account of the injury which their property sustains.

Are we to suffer such abuses to exist without making a single effort to raise our profession to that rank of public estimation which it so justly deserves? No! Let a meeting of the profession be called, and a committee appointed. Let the governors of the institution, and the professor and his assistant, be invited to join us, that means may be taken to accomplish this necessary work. I can have no reason to believe that there will be any objection on their part, as I was informed by Mr. Sewell, last December, that the governors have had the opinion of the Lord Chancellor upon the subject, which was, that nothing could be done without an act of parliament for our protection.

Should, however, these gentlemen refuse to assist us, there will be no difficulty in raising ample funds, by subscription, to defray the expenses of such an act, as every country veterinarian must feel the necessity of some decisive measures being taken, and will be inclined to make a corresponding pecuniary sacrifice.

Melton Mowbray.

Feb. 18th, 1829.

REPORT.

[**Uganda Protectorate. Annual Report of the Veterinary Department for the year ended 31st December, 1928.** Printed by the Govt. printer, Uganda, at Entebbe, pp. 23]

The Veterinary Department in Uganda includes a Director of Veterinary Services, a Deputy Director, a Veterinary Pathologist, ten Veterinary Officers, six Stock Inspectors, and two Indian Veterinary Assistants.

The Staff is grouped into three main divisions, *viz.*, (1) Administration; (2) Research; (3) Disease Control. Two of the ten veterinary officers in the Disease Control division are designated senior veterinary officers.

The Director of Veterinary Services and the Deputy Director are new designations made during the year; formerly the titles were Chief Veterinary Officer and Assistant Chief Veterinary Officer respectively.

The change of designation seems to make for simplicity and dignity; moreover, the abbreviations D.V.S. and D.D.V.S. have been made familiar by military use. There is, in fact, something reminiscent of military precision in the organisaton and work of the Uganda Veterinary Department: the determined and largely successful struggle against rinderpest during the year 1928, with which the report is chiefly concerned, reads like a war of the right sort, a war against the forces of evil. The opening paragraphs, which are quoted as follows, show what a real struggle it was.

"RINDERPEST."

"The policy of this department is to refuse to regard rinderpest as enzootic. Strong efforts have been made in recent years to eradicate the disease, and in 1925 success was obtained, rinderpest being eliminated from the Uganda Protectorate, whilst, in 1926, only one small centre existed, situated on the Kenya—Uganda border.

"It is, however, a matter for grave consideration if such a policy is correct, in view of the fact that neighbouring territories appear unable to eradicate successfully the disease, thus tending to create Uganda an island of susceptible cattle in a sea of rinderpest.

"The incidence and spread of this disease caused acute anxiety during the past year, and it was only by the most strenuous efforts that a sweeping and widespread epizootic throughout the entire Protectorate was checked.

"The *Western* and the greater portion of the *Buganda Provinces* were maintained free from invasion, as was the West Nile district of the Northern Province.

"The *Eastern Province* suffered heavily, especially in the eastern and northern sections, and the total loss in cattle to the province can be regarded as not less than 150,000 to 180,000 head.

"To differentiate accurately between deaths that were due to rinderpest and those due to thirst is hardly practicable in areas such as Karamoja and Usuku, and the figure quoted is the estimated total loss experienced during the abnormal conditions of combined drought and disease.

"They would have been greatly diminished had one or the other factor been absent—the combination proved very fatal."

All the known methods of combating the spread of rinderpest were used to the fullest extent. Serum was prepared on a great scale. At Teso alone 4,005,210 c.c. of serum were produced at an average cost of six cents. per dose of 40 c.c. The number of cattle double-inoculated was 163,860. Serum-alone, 2,308.

In comparison with reports from India these figures are especially interesting, indicating as they do how much less serum-alone inoculation is practised in Africa than in India.

The following paragraphs from the report indicate the relative extent of the losses from (a) rinderpest; (b) inoculation:—

"90. *Mortality.* The average mortality from rinderpest encountered in the Eastern Province amongst adult cattle was:—

In the north and east 55%—70% approximate.

In the south and west 70%—85% approximate.

"91. In Buganda the average inoculation mortality in camps amongst adult stock was 20% and in calves 57%, with a natural infection loss of 80%—95% and 98%—100% respectively."

In many instances the disease appeared to have been spread by game, notably buffalo.

The illicit movements of infected cattle, and of meat and hides from infected cattle, contributed considerably to the spread of the disease.

Vigorous measures were taken to control the invasion at critical points, notably there was established in conjunction with the provincial administration a strict quarantine line from Lake Albert to Lake Kioga, a distance of 120 miles.

The great danger was that if the disease became uncontrollable it would sweep through Teso and Lango into Bunyoro, "destroying in its course not less than 300,000 cattle."

The report, however, so far as this great outbreak of rinderpest is concerned, ends on a hopeful note, as the following quotation reveals:—

"The position at the termination of 1928 was as follows: The Western Province cattle remained free, whilst in Buganda there only existed two small outbreaks in the extreme north-eastern corner of Buruli County with the reacting cattle in Bugerere.

"The districts free from rinderpest in the Eastern Province were Busoga, Bugishu and Bugwere, with one outbreak on the Kenya—Uganda border in Budama.

"Lango recorded one small centre—an inoculation camp of eighty head—in the extreme west—whilst in Teso there existed four centres.

"Gulu, in the Northern Province, showed one small outbreak with Chua, Bunyoro and the West Nile free from the disease under review. The future position depends almost entirely on game, mainly pig and buffalo.

"Deaths of the latter species have been reported from Northern Singo, which development menaces the Western Province, and also from Southern Bugerere, which endangers south and central Kiagwe.

"Organisation is in progress under the control of the Assistant Live Stock Officer to meet experimentally the last-mentioned danger, with a view to destroying as large a number of buffalo as practicable and to drive them northwards in the effort to protect South Kiagwe stock.

"It is not possible to foretell what success will be obtained from these novel measures."

There are interesting references to the variations that were found in the efficacy of sera from different sources :—

" The conclusions reached after experience of field serum preparation in West Nile, Bugishu, Budama and Teso are that for satisfactory results in the field the serum must be prepared from animals which are more susceptible than, or as susceptible as, the stock which is to be inoculated. The type of immunising reaction experienced by the serum producing animals must also be taken into account. Thus in areas like Buganda and Bunyoro where the susceptibility, gauged on the natural mortality (80%—95%) is very high, the serum prepared from naturally recovered stock could be used satisfactorily anywhere in the Protectorate, whilst serum, say, from naturally recovered stock, which experienced a mortality of 45%—60% would only be efficacious in cattle of low susceptibility."

An important section of the report deals with experiments that were carried out in the field, apparently by Mr. J. Carmichael, veterinary officer, Buganda Province. A reproduction of this section here would take up too much space in a brief review, but those who are concerned with the control of rinderpest should not fail to acquaint themselves with the details of the experiments.

The observations on other diseases are brief. Pleuropneumonia, of which " there were not less than 332 active centres in 1921-23," is almost non-existent.

Trypanosomiasis, *per se*, caused no serious losses so far as was definitely known but, as the report states in the section on rinderpest, the need for inoculating (against rinderpest) trypanosome-infected animals obviously caused a certain mortality which adversely influenced the inoculation statistics.

Concerning East Coast fever and redwater, we read that " these diseases can be considered to be enzootic in this Protectorate " ; the report does not contain any estimate of the losses from these diseases.

Under the heading " Diseases of other Animals " it is stated that heavy losses occurred among sheep imported from Lango to Buganda from a highly infectious disease of which the nature could not, in the difficult circumstances of the rinderpest outbreak, be investigated.

Perhaps the happiest feature of the report is the reference at justifiable length to " the marked progress obtained in regard to native opinion." Whereas, as lately as in 1920, the general attitude of the native cattle owners in some provinces was hostile to the work of the Veterinary Department, it is now on the whole favourable and even helpful.

The Director of Veterinary Services (Mr. W. F. Poulton) is to be congratulated on his report : it is well up to the standard, in its concise clearly-stated record of hard work, well done, of an African veterinary report ; and that standard, as we have all come to recognise, is a high one.

There is, however, a weak point in the report, but it is not a weak point of Mr. Poulton's nor does it reflect adversely on any member of his staff. It is, or it would seem to be, a weak point in the system of veterinary administration in Africa, and it is essentially indicated in the first two paragraphs of the report as quoted at the beginning of this review, under the heading " Rinderpest."

These two paragraphs sufficiently show the difficulty, if not the impracticability, of administering veterinary matters on the African continent piece meal as though each Protectorate and each territory were an island like Great Britain.

Unless and until veterinary administration of the African territories can be co-ordinated with one main control and one main policy, much work will be done in vain.

Anyone who regularly reads these African veterinary reports cannot fail to observe the frequency with which the compiler refers to the danger of re-infection from without of an area which he and his staff have painfully cleared of a certain disease. The question of the part played by game in the dissemination of rinderpest, if not of trypanosomiasis, seems as unsatisfactory as ever. If it is a vital factor, if rinderpest can be and is still spread by game alone, the loss of 150,000 to 180,000 head of cattle in 1928 in the Uganda Protectorate would seem to be a big price to pay for the co-existence of the buffalo.

REVIEW.

[**Canine Nursing.** By D. E. Wilkinson, M.R.C.V.S. Pages 40, with six illustrations. Published by Watmoughs, Ltd., Idle and London. Price, 3s. 6d.]

This is a handy little book, likely to prove very useful to dog owners and breeders, and designed to assist them in the nursing and general management of canine patients. The first and second chapters deal with various points of construction, general arrangement and equipment of a canine hospital. The suggestions embodied here are very detailed, and if they are followed out the work of the hospital, both for the nurse and the veterinary surgeon, will be rendered much more easy than is frequently the case. Chapters 3 and 4 deal with surgical nursing, the preparation of a patient for operation, and restraint, and include numerous serviceable hints even to those who are already experienced in these matters. Chapters 5 and 6 deal with medical nursing, the administration of medicines, and the nursing of nervous affections. The feeding of sick dogs is dealt with very fully in Chapter 7. Perhaps this is the best section, and it cannot be other than helpful. The final chapter concerns itself with general nursing.

The booklet is written in a very lucid manner, and is unusually free from technical language, so that it can be quite readily understood by every dog owner. There is a commendatory foreword written by Mr. Croxton Smith, who says that " it gives just the sort of help I should have valued highly when I had a large kennel. It would have saved me many mistakes, and . . . would have been conducive to the comfort and well-being of my dogs." We believe that opinion will be echoed by many dog lovers who take the opportunity of reading it.

Shipley Bowls Challenge Cup.

As a result of the competition for the Shipley Bowls Challenge Cup, recently held, the sum of £7 12s. 6d. was realised and has been transmitted to the Victoria Veterinary Benevolent Fund, in accordance with the custom set up by the late William Shipley. The winner was Mr. H. Godbold, of Stowmarket.

ABSTRACTS.

The Pharmacology and Toxicology of Tetrachlorethylene.

Since Hall and Shillinger reported in 1925 that the anthelmintic properties of tetrachlorethylene (C_2Cl_4) approximated those of carbon tetrachloride (CCl_4), a number of reports on the use of this compound in man and different animals have been published. All authors agree that tetrachlorethylene is less toxic than carbon tetrachloride. Even in moderate doses carbon tetrachloride produces liver damage and a disturbance of liver function, and it might be expected that a certain degree of liver change would occur after the use of tetrachlorethylene.

Experiments reported by Lamson, Robbins and Ward in the *American Journal of Hygiene*, volume ix. No. 2 (March 1929) confirm the fact that tetrachlorethylene is less toxic than carbon tetrachloride and indicate that it behaves in an entirely different way.

A quantitative study of the rate of absorption was made on animals anæsthetised with sodium barbitone. The tetrachlorethylene was injected through a fine needle into an exposed loop of intestine. Tracheotomy was then performed, and the expired air collected and analysed. After injecting into the intestine of normal dogs doses of 10 c.c. per kilo, no tetrachlorethylene was found in the expired air, although the test employed is capable of detecting one part of tetrachlorethylene in forty thousand parts of air. An Eck fistula was then performed and the liver shunted out of the circulation by tying the portal vein and the hepatic artery. On repeating the experiment tetrachlorethylene was still absent from the expired air, showing that it is not absorbed to any appreciable extent from the intestine of the normal dog. In the case of puppies receiving 4 c.c. per kilo, the concentration in the expired air was from 3 to 6.3 milligrammes per litre in one puppy and 3.2 to 4.7 milligrammes per litre in another, or slightly less than the amount of carbon tetrachloride obtained in a similar experiment. After doses of 4 c.c. per kilo of tetrachlorethylene, together with 200 c.c. of cream, the expired air contained 6 milligrammes per litre in the case of one dog and of 3.2 to 4.8 milligrammes per litre in the case of another, after a dose of 5.5 c.c. per kilo, thus indicating that the presence of fat in the intestine favours the absorption of the drug, if it is given in large doses.

A concentration of 62 mgms. of tetrachlorethylene per litre of air was sufficient completely to anæsthetise dogs by inhalation. The animals went through the various stages of anæsthesia such as are seen after the inhalation of carbon tetrachloride, showing decided muscular rigidity, but there was an enormous increase in the amount of saliva secreted, which does not occur under carbon tetrachloride anæsthesia. Animals recover from tetrachlorethylene anæsthesia in approximately the same length of time as after carbon tetrachloride and show no abnormality of function nor any pathological changes in the liver or kidney. The margin of safety between the concentration necessary to produce complete surgical relaxation and that necessary to produce death is so slight that tetrachlorethylene cannot be recommended as a general surgical anæsthetic. Inhalation of tetrachlorethylene in large amounts or its injection into the femoral vein produces a marked fall in blood pressure, as well as a temporary stoppage of respiration. This fall in blood pressure is produced if the vagi are cut or if atropine is administered before the tetrachlorethylene, but not when the injection is made into the portal vein, indicating that the liver is able to take up tetrachlorethylene.

No significant pathological changes were found in the livers or kidneys of a total of 116 dogs, puppies, cats, rabbits and mice that were given doses ranging from 0.3 c.c. to 25 c.c. per kilogramme ; sections were made for examination forty-eight hours after administration of the drug. The tetrachlorethylene was given either alone or mixed with cream or with alcohol and also by inhalation. In the case of one dog and one bitch killed forty-eight hours after the administration of a dose of 4 c.c. per kilogramme, the liver, kidney, spleen, testes, pancreas, thyroid, parathyroid, heart, lungs, bone marrow, muscles and suprarenals were all normal. Mixed diets, diets rich in meat and others rich or low in calcium had no effect on the pathological findings.

The results of toxicity experiments showed that rabbits tolerated doses of 3 c.c. per kilo orally although 5 c.c. or more proved fatal within seven to twenty hours. Cats receiving doses from 4 or 10 c.c. per kilo died after intervals ranging from six to thirty-six hours. Some dogs were killed by oral doses ranging from 10 to 25 c.c. per kilo, but other dogs survived such doses without any apparent harm. The presence of fat in the stomach and intestines evidently promotes the absorption of tetrachlorethylene and death may supervene, especially if large doses are given. In all cases death seemed to be due, not to secondary changes consequent upon liver damage, but to an overdose of an hypnotic, as narcosis occurred very soon after dosing, and the animals did not regain consciousness up to the time of death.

The authors conclude that the value of tetrachlorethylene should not be judged merely by comparison of the lethal dose with that of carbon tetrachloride. Neither of these substances is lethal to normal dogs regardless of dosage, except in rare instances, but carbon tetrachloride always produces pathological lesions while tetrachlorethylene apparently never does so. Tetrachlorethylene causes no symptoms or demonstrable pathological changes in dogs when taken orally in the therapeutic dose, either alone, with alcohol or in conditions of high or low calcium balance. The experiments indicate that it could be used in the treatment of hook-worm disease with far greater safety than oil of chenopodium or carbon tetrachloride.

[**Ovine Coccidiosis.** Carré (H.). *Rec. Med. Vet.* 1928. Sept. Vol. 104. No. 9. pp. 530-539. Ex. *Trop. Vet. Bull.* Vol. 17. No. 1.]

The author finds that ovine coccidiosis is more widely spread, at least in some districts in France, than has generally been thought, and that rapidly fatal cases in lambs may kill off 25 per cent. of the whole number in the flock.

In animals infected with coccidia the symptoms are extremely variable because the condition ranges from animals which are very lightly infected, and which appear to be in perfect health, to those heavy infestations which

kill very rapidly. Further, the condition is not infrequently complicated by parasitic gastro-enteritis. In the very acute cases there is marked constipation, and the fæcal pellets are covered with shreds of mucus, sometimes flecked with blood. In rare cases actual clots may be passed.

This form of the disease occurs in lambs of one to two months, and death may occur within a day or two of the first evidence of ill-health being observed. In such cases dyspnœa and acceleration of the heart may be observed a few hours before death.

These symptoms the author believes to be due to a toxic action on the nerve centres.

The lesions of the disease vary greatly in extent. The author quotes DAUVOIS as saying that they occur in the intestine, liver, kidneys and muscles.

In cases of what Carré calls "latent" coccidiosis, that is to say, cases presenting no sign of ill-health, the lesions occur as small white specks in the mucous membrane of the intestine. These lesions are not found in acute or chronic cases in lambs. The mucous membrane in such cases may be so thickened as almost to occlude the lumen of the bowel.

The lesion in the muscles, which Carré says was first pointed out by DAUVOIS, takes the form of a longitudinal streaking, caused by blanching of certain fibres.

Carré attributes the condition known in England as "pulpy kidney" in lambs to the presence of coccidia.

Thymol is described as being the most effective medicinal remedy. It is given dissolved in oil at the rate of 1 gramme per 40 kilos body weight. It is given daily for 5 or 6 days, and then repeated after an interval of a week.

[**Bovine Arteriosclerosis.** TIBIROÇA (P. de Q. T.). *Ann. da Facul. de Med. de São Paulo.* 1927. Vol. 2. pp. 311-372. With 20 figures. English summary p. 371. Ex. *Trop. Vet. Bull.* Vol. 17. No. 1.]

The author describes the pathological conditions encountered in 50 aortas obtained from oxen of various types and ages.

The lesions occurred in various parts of the vessels and they are classified as plaques, depressions, wrinklings, nodules, dilatations, etc.

Microscopic examination revealed stenosis, calcification, rupture of the elastic coat, hyperplasia, etc.

The more important lesions were as follows:—Longitudinal ridges running from the point of origin of the renal arteries to the external iliac arteries. Histological examination showed that there was muscular hyperplasia and splitting of the internal elastic layer with an increase of elastic fibres in the interna.

Dilatation of the aorta was found to be due to rupture of the circular elastic fibres.

Calcareous lesions were found in the muscular and elastic coats. These were surrounded by thin fibrous capsules.

[**Intravenous Injection of Colloidal Carbon in Human and Veterinary Medicine.** CONKLIN (R. R.). *Cornell Vet.* 1928. Apr. Vol. 18. No. 2. pp. 205-214. Ex. *Trop. Vet. Bull.* Vol. 17. No. 1.]

The material used was chemically pure animal carbon suspended in distilled water. The bones from which it was prepared were cleaned free of soft tissues before charring. The earthy salts were removed by concentrated hydrochloric acid and the acid thoroughly washed away. The particles were then thoroughly ground up in a sterile mortar and test suspensions made to ascertain the size of the particles. Usually it was attempted to get particles about 1 micron in diameter. The suspension is autoclaved. (Fuller details are not given.)

By experiment it was found that 0.001 gramme per kilog. gave the best results, and the suspension was such that a horse of average size was given 50 cc.

The treatment is given intravenously by gravitation. Introduction of the suspension into the connective tissues leads to nodule formation.

It is claimed that great benefit has been derived from the treatment in cases of joint ill in foals, metritis, lymphangitis accompanied by ulceration, calk wounds, mastitis, septicæmia resulting from the use of a septic milking tube, and abscess formation.

Over a hundred cases have been treated in domesticated animals with complete success and without a single fatality.

It is stated that there is no "negative phase," that following the injection there is a rise of temperature with acceleration of respiration and perspiration. These symptoms pass off within an hour.

No explanation is offered as to the manner in which the treatment acts, but suggested explanations are mentioned.

Details of four or five cases are given.

[**Recent Contributions to our Knowledge of Poisonous Plants as affecting Domestic Animals.** METTAM (R. W. M.) *Kenya and East African Med. Jl.* 1928. June. Vol. 5. No. 3. pp. 68-76. Ex. *Trop. Vet. Bull.* Vol. 17. No. 1.]

Plant poisoning occurs under certain conditions, the principal of which are: (1) the introduction of animals to a pasture with which they are unfamiliar; (2) scarcity of grazing; (3) accidental consumption of poisonous plants in hay.

In connexion with plant poisoning it must be remembered that toxic symptoms may possibly be due to some parasite or fungus on the plant.

It is important to note that many excellent fodder grasses may become exceedingly poisonous under certain conditions. Sorghum and andropogon produce hydrocyanic acid on wilting.

The so-called colour index of Henrici may prove of value when searching for grasses which may have become poisonous. HENRICI found that grasses which have a reddish purple stem during drought possess very little cyanogenetic substances, while those which have normal coloured stems produce a high percentage of hydrocyanic acid.

It is important to add that wilted grasses swollen by rain lose their cyanogenetic substances in a few hours.

Tribulus terrestris, the cause of geeld dikkop in South Africa, occurs in Kenya, but up to the present there is no record of its being toxic. It is remarkable that feeding tests carried out in Australia with this plant have always failed—a possible explanation of which is that the experiments have not been carried out there with the plant at the

exact stage at which THEILER found it poisonous, namely, while it is growing vigorously before the formation of seeds.

A further point to be borne in mind is that plants vary in toxicity according to the soil upon which they are grown.

Many types of plant poisoning occur in districts where certain diseases are endemic. CURSON has recorded the occurrence of Acokanthera poisoning in districts where heartwater occurs—the symptoms of these conditions are very much alike. Mettam is able to confirm CURSON'S observation and in one outbreak 25 deaths among cattle were traced to *Acokanthera schimperi*.

Many investigators believe that there may be some connexion between the flora of a country and certain diseases—diseases other than those requiring an insect vector—and particularly those due to filterable viruses. Horse-sickness is a case in point. This occurs in certain districts the flora of which is fairly typical of low-lying hot country. So far the reservoir of the virus has not been detected, and, further, the virus can survive for several years in a district where there are no horses and infects an animal introduced. It appears to be feasible that the virus is not absolutely dependent on animal life, but may exist as a parasite—possibly on some vegetable structure. This point requires investigation, because it is known that plants suffer from diseases due to filterable viruses, and little has been done to see whether these have any pathogenic properties for animals.

Reference is made to the peculiarities of chronic vegetable poisoning, such as production of parenchymatous hepatitis in horses by *Senecio latifolius*, the most important point in connexion with which is the period elapsing between the cessation of feeding and the onset of clinical symptoms.

The writer records an instance in which a number of animals wandered off their usual grazing ground to the dried-up bed of a stream and 47 died between one afternoon and the next morning. No *post-mortem* examinations were made and on searching a plant—one of the Umbelliferæ—was found in the river bed which did not occur in the pasture. Experiments were begun at the farm and at Kabete, with remarkable results, for all the experimental animals died within 12-18 hours. Roots and stems were particularly poisonous. Two ounces were toxic for sheep and goats, and 8-12 ounces for cattle.

The plant has not yet been identified because at the time no flower or fruit could be obtained, but flowering specimens have been sent to Pretoria for identification.

PROGNOSTIC VALUE OF INTRADERMAL INJECTIONS OF HORSE SERUM.

A. Fiorentini (*Il Policlinico*, Sez. Prat., May 27th, 1929, p. 731) gives the results of some 700 injections of horse serum in 223 patients suffering from various diseases, mostly tuberculosis or syphilis. He finds that a negative reaction is of bad prognostic import, especially when this is persistently negative or becomes negative after a brief positive reaction. Of the 46 who gave a persistent negative reaction, 7 died. The patients could be classified in three groups: those who gave a positive reaction at once; those who gave a preliminary negative followed by a positive reaction; and those who were negative throughout. In the third class the prognosis is unfavourable.—*British Medical Journal*.

DIVISIONAL REPORTS.

Lancashire Division, N.V.M.A.*

A general meeting of the Lancashire Division, N.V.M.A., was held at the Grand Hotel, Manchester, on Thursday, June 27th, 1929.

The Chair was occupied by the President, Major W. G. Burndred, and other members present were Messrs. J. Spruell, J. Holroyd, R. C. Locke, G. H. Locke, W. Woods, E. H. Curbishley, J. Norbury, H. D. Heggarty, and J. Birtwistle. *Visitors*: Prof. G. H. Wooldridge, Messrs. J. C. Naylor and H. Davies.

Apologies for unavoidable absence were received from Messrs. H. Holroyd, F. Hopkin, Col. Brittlebank, Warwicke Fowle, A. W. Noel Pillers, J. Clarkson, G. Mayall, P. Manuel, E. F. Wood, Prof. Gaiger, H. L. Torrance and J. H. Carter.

The minutes of the last meeting were taken as read.

Veterinary Thanksgiving Fund.—The Secretary read a letter from Col. Brittlebank expressing his regret for his unavoidable absence from the meeting, and at the same time making a special appeal to the members of the "Lancashire" to support the Veterinary Thanksgiving Fund.

It was proposed by Mr. J. HOLROYD, seconded by Mr. G. H. LOCKE, and carried unanimously, that the Association contribute five guineas to the Fund.

Nominations for Membership.—Messrs. J. C. Naylor (Alderley Edge), J. Cochrane-Dyet (Cranmere), Allan Leslie (Manchester) and E. W. Prescott (Salford) were nominated for membership of the Division.

A letter was read from the Secretary of the National Veterinary Medical Association asking for particulars of Committees on which representatives of the Lancashire Division desired to serve. It was agreed that it should be left to the representatives concerned to choose their own Committees.

Obituary.—Mr. Curbishley referred to the loss sustained by the Association in the death of Mr. J. F. Dixon, and he moved that a letter of condolence be sent to his widow and daughter.

It was also moved by Mr. Woods that a letter of condolence be sent to Sir John M'Fadyean who, by the death of his wife, had lost a well-beloved partner.

The meeting stood in silence as a token of respect.

That concluding the business of the meeting, the President then called upon Mr. BIRTWISTLE to give his paper, "Some Observations on the Use of the Danish Embryotome." (Mr. Birtwistle's paper is published, together with the discussion which ensued, elsewhere in this issue of the *Record*.—ED.)

Major BURNDRED welcomed Prof. Wooldridge on behalf of the Division and expressed gratification that he was present at the first ordinary meeting during his term of office. He hoped to see Prof. Wooldridge present on many more occasions. He was grateful to Mr. Birtwistle for exhibiting his instrument that afternoon and promoting such an interesting discussion.

JOHN SPRUELL, *Hon. Secretary*.

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*Received on 24th July.

Midland Counties Division, N.V.M.A.*

EXCURSION INTO THE PEAK DISTRICT.

The summer meeting of this Division took the form of an excursion into the Peak of Derbyshire, members being accompanied by their ladies. The day chosen was Thursday, August 1st, and, except for a sharp shower in the early part of the afternoon, the weather was not unfavourable. The country was at its best, and the programme proved enjoyable in the extreme.

The party assembled at Derby station at half-past eleven, and the drive by char-a-banc was commenced. The place chosen for luncheon was the Rutland Hotel, Bakewell, and it was reached by a circuitous route. A call was made at Haddon Hall, and although this famous house is closed to the public since the Manners family have gone into residence, Mr. Marrison, of Bakewell, a member of the Division, managed to secure admission. The chapel, the banqueting room, and other features were inspected and then a move was made for Bakewell.

LUNCHEON.

The luncheon was presided over by Mr. W. E. Ison (Atherstone), president of the Division, with whom was his sister, Miss Ison, and a special guest was Mr. V. R. Burke, the Duke of Devonshire's agent, who had kindly interested himself in the later proceedings. The company also included Mr. and Mrs. H. J. Dawes and Miss Dawes (West Bromwich), Mr. and Mrs. W. H. Brooke and Miss Brooke (Handsworth), Mr. and. Mrs. H. W. Steele-Bodger (Tamworth), Mr. and. Mrs. R. Lake (Ashby-de-la-Zouch), Mr. S. M. Woodward and Miss D. Woodward (Birmingham), Mr. A. Forsyth and Miss Forsyth (Cannock), Mr. and Mrs. T. H. Hobson (Leicester), Mr. and Mrs. J. W. Conchie (Kidderminster), Mr. and Mrs. H. S. Cockburn and Mrs. Hunter (Eastwood), Mr. L. W. Heelis (Solihull), Mr. G. Banham and Mr. G. F. Banham (Stratford), Mr. E. Marrison (Bakewell), and Mr. F. L. Gooch (Stamford).

There was no time after lunch for speeches, but the health of the King was drunk, and Mr. DAWES briefly proposed the toast of the President, to which Mr. ISON replied.

BUSINESS MEETING.

A short business meeting followed, when the HON. SECRETARY reported the receipt of a letter from Mr. Mark Tailby acknowledging his election as an honorary member of the Division. Mr. Tailby, one of the oldest practitioners in the country, was the "Father" of the Association, which desired to honour him in this way. Mr. TAILBY, on his part, asked that his fellow members should be his guests at luncheon on the occasion of the next quarterly meeting, and the invitation was accepted.

The HON. SECRETARY reported that Professor Macqueen had consented to read a paper at the next meeting.

New Member.—On the motion of the HON. SECRETARY, seconded by Mr. GOOCH, Mr. Percy Abson, of Nottingham, was elected a member of the Division.

Obituary.—The HON. SECRETARY mentioned that, since the last meeting, they had lost an old and esteemed member by death in the person of Mr. A. J. Curtis, of Shrewsbury. He proposed that a letter be sent to the family, in the name of the Society, expressing sympathy with them in their bereavement.

This was agreed to, and a similar letter was also ordered to be sent to the family of the late General Sir Frederick Smith.

VISIT TO CHATSWORTH.

The drive was then continued as far as Chatsworth, where again the good offices of Mr. Marrison secured privileges to the party which are not usually enjoyed. They were conducted over this famous house—the Palace of the Peak, it is called—and its wonderful contents were described, after which the gardens were visited under the guidance of the Duke of Devonshire's head gardener.

Another long drive, through beautiful country, brought the party to the little village of Swanwick, where tea was served, and Derby was finally reached at half-past seven.

H. J. DAWES, *Hon. Secretary.*

* Received on 20th August, 1929.

NOTES AND NEWS.

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events.

Sept. 9th—Meeting of the Editorial Committee, N.V.M.A., 10 Gray's Inn Square, London, at 4-30 p.m.

R.C.V.S. OBITUARY.

ANDERSON, James, Fettercairn, Kincardineshire, Graduated Edinburgh, January 17th, 1883. Died August 20th, 1929. Age 77 years.

CHAMBERS, William, Fair Street, Drogheda, Co. Louth. Graduated London, April 25th, 1865. Died 18th August, 1929. Age 84 years.

KERRY, George William, Newmarket, Suffolk. Graduated London, 19th December, 1872. Died 28th August, 1929, aged 76.

PERSONAL.

Marriage. WILKINSON—BIANCHI. On Aug. 14th, 1929, David Eric Wilkinson, M.R.C.V.S., of Oakwood, Chigwell, to Audrey Irene, third daughter of the late Col. Bianchi and Mrs. Bianchi, of Woodford, Essex.

SUCCESSFUL R.C.V.S. PROSECUTION.

At Ampthill Petty Sessions on August 15th, the Royal College of Veterinary Surgeons secured the conviction of Frederick New, Ampthill, on a charge of falsely describing himself as a veterinary surgeon.

Defendant, who said that he thought he had been put on the Register and had practised for forty-five years, was dealt with leniently by the Bench, who find him 30s., saying that the costs would come to a large figure.

ARMY VETERINARY SERVICE.

LONDON GAZETTE. WAR OFFICE. REGULAR ARMY RESERVE OF OFFICERS.

Aug. 27—Lt.-Col. F. Fail, O.B.E., having attained the age limit of liability to recall, ceases to belong to the Res. of Officers (Aug. 9).

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MOVEMENTS OF OFFICERS.

Major F. Hogg has been posted to Woolwich for duty as Officer Commanding, R.A.V.C. Depôt.

Major L. Danels has been appointed Officer i/c R.A.V.C. Records.

Major J. Smith has returned to India from sick leave.

Major G. E. Oxspring has been posted from Aldershot to the Eastern Command, and is now doing duty at Brighton.

Major F. C. O'Rorke, C.M.G., F.R.C.V.S., has been posted from the Royal Military College, Camberley, to York, for the purpose of officiating as Assistant Director of Veterinary Services, Northern Command, during the absence on leave of Lieut.-Colonel H. E. Gibbs, D.S.O., and pending the appointment of a successor.

Major W. M. Rouse has been posted from Woolwich to the Remount Depôt, Melton Mowbray.

Captain L. R. Swifte has been posted from Woolwich to Hounslow.

Major R. W. Mellard, D.S.O., is officiating as A.D.V.S., Eastern Command, during the absence on leave of Colonel Pallin.

Colonel H. S. Mosley, D.S.O., assumed duty as Deputy Director of Veterinary Services, Aldershot Command, with effect from the 24th August.

Brevet Lieut.-Colonel E. P. Argyle, D.S.O., assumed duty as Commandant, Royal Army Veterinary School and School of Farriers, with effect from 24th August, vice Colonel H. S. Mosley, D.S.O.

Major C. H. S. Townsend, O.B.E., M.C., F.R.C.V.S., is at present in this country on leave from Gibraltar.

Major T. Hodgins is at present on leave in this country from the Sudan.

Undulant Fever Caused by *B. abortus*.

Recently, in the House of Commons, Mr. Noel Buxton, replying to Mr. Guinness, said he understood that the Ministry of Health would shortly issue a report, containing the evidence, mainly obtained abroad, on which was based the theory that a form of undulant fever was caused by the bacillus which produced abortion in animals. The publication of this report would attract the attention of medical and veterinary practitioners and research workers to the study of this question, on which, so far as this country was concerned, there was at present little information.

H.M. Stationery Office Publications.

The undermentioned has been published recently. Copies can be purchased through any bookseller, or directly from H.M. Stationery Office, at the following addresses:—London: Adastral House, Kingsway, W.C.2, and 28 Abingdon Street, S.W.1; Cardiff: 1 St. Andrew's Crescent; Manchester: York Street; Edinburgh: 120 George Street.

	Price Net.	*Post Free.*
House of Commons Reports and Papers. (Session 1929-30).	s. d.	s. d.
14. Experiments on Living Animals. Return showing the Number of Experiments on Living Animals during the year 1928, under Licences granted in pursuance of the Act 39 and 40 Vic. c. 77, distinguishing the Nature of the Experiments (in continuation of Parliamentary Paper, No. 109 of Session 1928)	1 3	1 5

Ireland's Stock Breeding Enterprise.

The development of live stock breeding in Ireland in recent years—which can be quite fairly gauged by the figures of imports from that country to Great Britain and the Isle of Man—has been quite remarkable. So far as the first six months of this year are concerned, we find that the imports of cattle have only been once exceeded in the last seven years—in 1924. They were heavier on the year by 62,000 head, and more than 100,000 in excess of the corresponding total in 1927. There has been little change in the case of fat cattle, but so far as others are concerned, principally stores, the extraordinary total to date of 212,000 head represents an increase of 40,000 on the first half of 1928. There has been an increase of 5,000 in the number of milk cows, "springers" rose by 2,800, and calves by 13,100. Such heavy exports from Ireland must be regarded as a tribute to the vigorous enterprise of the Irish farmers, who are not only developing their cattle breeding activities, but greatly improving the character and quality of their stock, this latter being, it may be taken, the result of the policy that has been pursued of buying in an improved class of bulls. The export of sheep and lambs from Ireland during the first six months of the year has been nearly as great as in the first half of last year, and larger than in any of the previous five years. The number of pigs imported to Great Britain from Ireland has been smaller than in the corresponding months of 1928 by over 27,000, or 18 per cent., but owing to the small imports recorded in 1925 and 1926, the imports this year have been in excess of the average arrivals in the same months of the previous five years.—*North British Agriculturist.*

"It has been contended by some, in defence of tuberculous milk, that a small dose of tubercle bacilli may set up immunity in a child and protect it from far more serious disease later. This is a fallacious and dangerous contention. It *may* be true that a carefully regulated dose of bacilli which have been killed or treated in some way so as to reduce their virulence may set up some degree of immunity, but the confusion of such a careful and guarded method of inoculation with the administration, at haphazard and in unknown dosage, of virulent tubercle bacilli in dirty milk from diseased animals, is evidence of a complete lack of appreciation of the scientific issues involved."—Dr. D. Morley Mathieson, Medical Officer of Health, Birkenhead.

The City's Rats.—Among the many interesting facts about the City of London revealed by the new City Medical Officer, Dr. Willoughby, in his recently-issued report (which we shall shortly be reviewing) is the not unimportant revelation that not only are there fewer people and fewer horses in the City, but there are fewer rats. One firm of rat catchers caught 25,748 rats last year.

The brown rat is fast disappearing, and the smaller black rat will gradually become rarer, the Medical Officer thinks, as new buildings replace old.

Observations suggest that the brown rat is now outnumbered by the black rat by about 3 to 1.

The black rat is a climber. Even the roof must receive attention if he is to be kept out.

Bob's Tombstone.

A Gloucestershire practitioner forwards us the following epitaph, which adorns a dog's tombstone in his district:—

Bob. Dick, 1878.

Near this spot
Are deposited the remains of one
who possessed beauty without vanity,
Strength without insolence,
Courage without ferocity,
And all the virtues of man without his vices.
This praise, which would be unnecessary flattery
If inscribed over human ashes,
Is but a just tribute to the memory of
Bob, a Dog,
who was born A.D. 1861,
and died A.D. 1879.

Jock, 1914.

The Editor acknowledges reports of the following meetings:—Of the Scottish Branch, N.V.M.A., from Mr. W. C. Miller, Hon. Secretary; West of Scotland Division, N.V.M.A., from Dr. A. W. Whitehouse, Hon. Secretary; V.M.A. of Ireland, from Prof. J. J. O'Connor, Hon. Secretary.

Communications from Capt. W. L. Little (Reading), Messrs. D. B. D. Pitt (Somerton), and H. W. Wilson (Cupar, Fife).

"The Use of Iodine and its Compounds in Veterinary Practice," by Lt.-Col. H. A. Reid, O.B.E., F.R.C.V.S., D.V.H., F.R.S.E., from publishers, De Gruchy & Co., Ltd., 45 Mitchell Street, London, E.C.1.